

T1 - Right Triangle Trigonometry

Defining Trigonometry and the six trig functions

Trigonometry – Triangle Measure

Trig Functions – relationship between the ratios of the side lengths and angle measures of a right triangle

Theta (θ) – greek letter used to represent an angle measure

Chief SOH-CAH-TOA

sine θ
cosine θ
tangent θ
cosecant θ
secant θ
cotangent θ

$$\sin \theta = \frac{\text{opp}}{\text{hyp}}$$

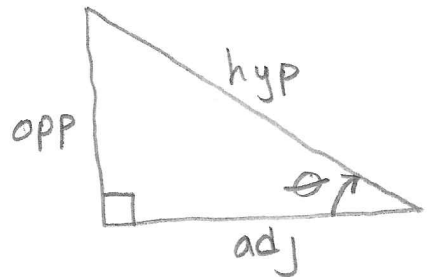
$$\cos \theta = \frac{\text{adj}}{\text{hyp}}$$

$$\tan \theta = \frac{\text{opp}}{\text{adj}}$$

$$\csc \theta = \frac{\text{hyp}}{\text{opp}}$$

$$\sec \theta = \frac{\text{hyp}}{\text{adj}}$$

$$\cot \theta = \frac{\text{adj}}{\text{opp}}$$



Reciprocal Functions

$$\sin \theta = \frac{1}{\csc \theta}$$

$$\cos \theta = \frac{1}{\sec \theta}$$

$$\tan \theta = \frac{1}{\cot \theta}$$

$$\csc \theta = \frac{1}{\sin \theta}$$

$$\sec \theta = \frac{1}{\cos \theta}$$

$$\cot \theta = \frac{1}{\tan \theta}$$

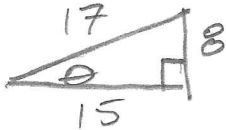
Other relationships

$$\tan \theta = \frac{\sin \theta}{\cos \theta}$$

$$\cot \theta = \frac{\cos \theta}{\sin \theta}$$

Example 1 Find values of trig ratios

The length of the side opposite θ is 8, the length of the side adjacent to θ is 15, and the hypotenuse is 17.



$$\sin \theta = \frac{8}{17}$$

$$\csc \theta = \frac{17}{8}$$

$$\cos \theta = \frac{15}{17}$$

$$\sec \theta = \frac{17}{15}$$

$$\tan \theta = \frac{8}{15}$$

$$\cot \theta = \frac{15}{8}$$

You try a) opp = 5 adj = 12 hyp = 13

You try b) opp = 21 adj = 20 hyp = 29

Example 2 Use one trig value to find the others

If $\cos \theta = \frac{2}{5}$, find the exact values of the five remaining trig functions for the acute angle θ

Pythagorean theorem: $a^2 + b^2 = c^2$

$$\cos \theta = \frac{2}{5}$$

$$2^2 + b^2 = 5^2$$

$$4 + b^2 = 25$$

$$b^2 = 21$$

$$b = \sqrt{21}$$



$$\sin \theta = \frac{\sqrt{21}}{5}$$

$$\csc \theta = \frac{5}{\sqrt{21}} \left(\frac{\sqrt{21}}{\sqrt{21}} \right) = \frac{5\sqrt{21}}{21}$$

$$\cos \theta = \frac{2}{5}$$

$$\sec \theta = \frac{5}{2}$$

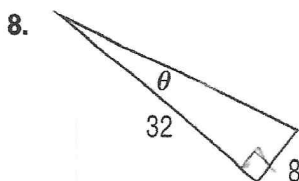
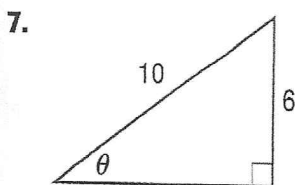
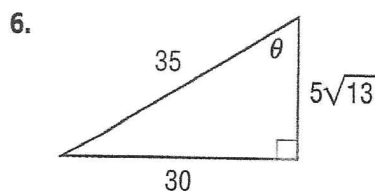
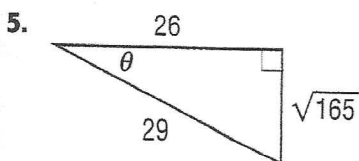
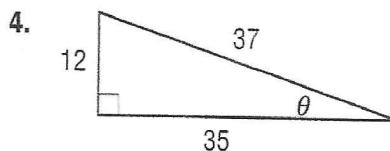
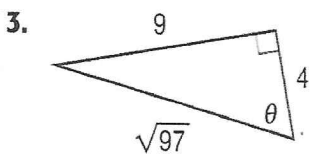
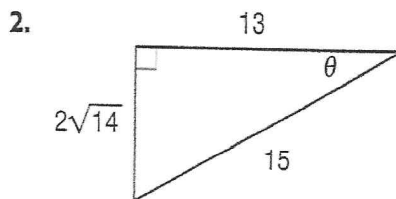
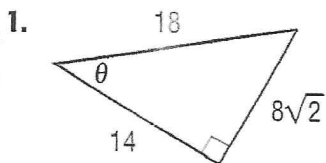
$$\tan \theta = \frac{\sqrt{21}}{2}$$

$$\cot \theta = \frac{2}{\sqrt{21}} = \frac{2\sqrt{21}}{21}$$

You try $\tan \theta = \frac{1}{2}$

T1 HW (1-18)

Find the exact values of the six trigonometric functions of θ .
(Example 1)



Use the given trigonometric function value of the acute angle θ to find the exact values of the five remaining trigonometric function values of θ . (Example 2)

9. $\sin \theta = \frac{4}{5}$

10. $\cos \theta = \frac{6}{7}$

11. $\tan \theta = 3$

12. $\sec \theta = 8$

13. $\cos \theta = \frac{5}{9}$

14. $\tan \theta = \frac{1}{4}$

15. $\cot \theta = 5$

16. $\csc \theta = 6$

17. $\sec \theta = \frac{9}{2}$

18. $\sin \theta = \frac{8}{13}$